

Ravi Chugh

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Research Interests

Programming Languages, Software Engineering, Human-Computer Interaction

Functional Programming, Program Synthesis and Repair, Refactoring, Structure Editors, Graphical User Interfaces

Education

University of California, San Diego, La Jolla, CA 2013

Ph.D., Computer Science

Dissertation Title: "Nested Refinement Types for JavaScript"

Dissertation Committee: Ranjit Jhala (Advisor), Samuel Buss, Alin Deutsch, Cormac Flanagan, Sorin Lerner

University of Pennsylvania, Philadelphia, PA 2007

M.S.E., B.S.E., Computer Science

Graduated *summa cum laude*.

Appointments

University of Chicago, Chicago, IL 2014 – present

Assistant Professor, Department of Computer Science

University of California, San Diego, La Jolla, CA 2013 – 2014

Postdoctoral Scholar

University of California, San Diego, La Jolla, CA 2007 – 2013

Graduate Student Researcher and Teaching Assistant

Mozilla Research, San Francisco, CA 2012

Research Intern

Microsoft Research, Redmond, WA 2009

Research Intern

Microsoft Corporation, Redmond, WA 2006

Software Design Engineer Intern

Microsoft Corporation, Redmond, WA 2005

Program Manager Intern

University of Pennsylvania, Philadelphia, PA 2004 – 2007

Teaching Assistant

Academic Honors

National Science Foundation 2017

CAREER Award

University of Chicago 2015

Neubauer Faculty Fellowship (undergraduate teaching award)

Grants

National Science Foundation 2018 – 2021

SHF: Small: Collaborative Research: Semantic Foundations for Hole-Driven Development (Award 1814900) ~\$247,000

Co-PI with Matthew Hammer (University of Colorado, Boulder)

National Science Foundation 2017 – 2022

CAREER: Direct Manipulation Programming Systems (Award 1651794) ~\$525,000

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| National Science Foundation <i>Midwest Programming Languages Summit 2016 (Award 1654961)</i> | 2016 \$5,000 |
| University of Chicago <i>College Research Fellows Grant</i> | 2015 \$3,000 |

Drafts

- Brian Hempel, Justin Lubin, and Ravi Chugh. **Output-Directed SVG Programming**. September 2018.
- Bowen Wang, Brian Hempel, and Ravi Chugh. **Predicting Haskell Type Signatures From Names**. September 2018.

Publications

2019

Cyrus Omar, Ian Voysey, Ravi Chugh, and Matthew A. Hammer. **Live Functional Programming with Typed Holes**. In *Proceedings of the ACM on Programming Languages (PACMPL), Issue POPL*, Lisbon, Portugal, January 2019.

2018

Mikaël Mayer, Viktor Kunčák, and Ravi Chugh. **Bidirectional Evaluation with Direct Manipulation**. In *Proceedings of the ACM on Programming Languages (PACMPL), Issue OOPSLA*, Boston, MA, November 2018.

Brian Hempel, Justin Lubin, Grace Lu, and Ravi Chugh. **Deuce: A Lightweight User Interface for Structured Editing**. In *International Conference on Software Engineering (ICSE)*, May 2018.

2016

Brian Hempel and Ravi Chugh. **Semi-Automated SVG Programming via Direct Manipulation**. In *ACM Symposium on User Interface Software and Technology (UIST)*, Tokyo, Japan, October 2016. Featured in “Research for Practice: Programming by Examples,” *ACM Queue* (January / February 2017) and *Communications of the ACM* (July 2017).

Ravi Chugh, Brian Hempel, Mitchell Spradlin, and Jacob Albers. **Programming and Direct Manipulation, Together at Last**. In *ACM SIGPLAN Conference on Programming Language Design and Implementation (PLDI)*, Santa Barbara, CA, June 2016.

Ravi Chugh. **Prodirect Manipulation: Bidirectional Programming for the Masses**. In *International Conference on Software Engineering Companion (ICSE-C), Visions of 2025 and Beyond Track (V2025)*, Austin, TX, May 2016.

2015

Ravi Chugh. **isoLate: A Type System for Self-Recursion**. In *European Symposium on Programming Languages (ESOP)*, London, UK, April 2015.

2008 – 2012

Ravi Chugh, David Herman, and Ranjit Jhala. **Dependent Types for JavaScript**. In *ACM SIGPLAN Conference on Object-Oriented Programming Systems, Languages, and Applications (OOPSLA)*, Tucson, AZ, October 2012.

Ravi Chugh, Patrick M. Rondon, and Ranjit Jhala. **Nested Refinements: A Logic for Duck Typing**. In *ACM SIGPLAN-SIGACT Symposium on Principles of Programming Languages (POPL)*, Philadelphia, PA, January 2012.

Juan Chen, Ravi Chugh, and Nikhil Swamy. **Type-preserving Compilation for End-to-end Verification of Security Enforcement**. In *ACM SIGPLAN Conference on Programming Language Design and Implementation (PLDI)*, Toronto, Canada, June 2010.

Nikhil Swamy, Juan Chen, and Ravi Chugh. **Enforcing Stateful Authorization and Information Flow Policies in Fine**. In *European Symposium on Programming (ESOP)*, Paphos, Cyprus, March 2010.

Ravi Chugh, Jeffrey A. Meister, Ranjit Jhala, and Sorin Lerner. **Staged Information Flow for JavaScript**. In *ACM SIGPLAN Conference on Programming Language Design and Implementation (PLDI)*, Dublin, Ireland, June 2009.

Ravi Chugh, Jan W. Voung, Ranjit Jhala, and Sorin Lerner. **Dataflow Analysis for Concurrent Programs using Datarace Detection**. In *ACM SIGPLAN Conference on Programming Language Design and Implementation (PLDI)*, Tucson, AZ, June 2008.

Workshop Papers

2017

Ravi Chugh. **Direct Manipulation Programming Systems (A Brief Introduction)**. White paper. In *ISAT/DARPA “Augmented Developers: Tools for Hybrid Man-Machine Software Engineering” Workshop*, Arlington, VA, February 2017.

2013

Ravi Chugh. **A Fix for Dynamic Scope**. In *ACM Workshop on ML*, Boston, MA, September 2013.

2012

Ravi Chugh, David Herman, and Ranjit Jhala. **Status Report: Dependent Types for JavaScript**. In *Workshop on Script to Program Evolution (STOP)*, Beijing, China, June 2012.

2011

Ravi Chugh, Ranjit Jhala, and Sorin Lerner. **Type Inference with Run-time Logs**. In *Workshop on Script to Program Evolution (STOP)*, Austin, TX, January 2011.

Presentations

Programming with Direct Manipulation in Sketch-n-Sketch: Three Years, Three Ideas

PLATEAU (Invited Keynote), Boston, MA November 5, 2018

Direct Manipulation Programming in Sketch-n-Sketch

ICFP Tutorials, St. Louis, MO (with Collins, Hempel, Lubin, and Mayer) September 27, 2018

Structured Editing for Elm* in Elm

elm-conf, St. Louis, MO September 26, 2018

Direct Manipulation Programming Systems

SPLASH-I, Vancouver, Canada October 25, 2017
University of Wisconsin, Madison, WI June 5, 2017
University of Maryland, College Park, MD February 20, 2017
University of Washington, Seattle, WA January 11, 2017

Interactive SVG Programming with Direct Manipulation

Strange Loop, St. Louis, MO September 17, 2016

Prodirect Manipulation: Bidirectional Programming for the Masses

ICSE, Austin, TX May 19, 2016

Program Synthesis for Direct Manipulation Interfaces

MIT, Cambridge, MA March 1, 2016
Harvard University, Cambridge, MA February 29, 2016
ECOOP PC Meeting, Brown University, Providence, RI February 28, 2016
PADL (Invited Talk), St. Petersburg, FL January 18, 2016
Midwest PL Summit, West Lafayette, IN December 4, 2015

IsoLate: A Type System for Self-Recursion

ESOP, London, UK April 14, 2015

Late Typing for Loosely Coupled Recursion

Dagstuhl, “Foundations of Scripting Languages,” Wadern, Germany June 30, 2014

Modern Type Systems for Dynamic Languages

Samsung Research, San Jose, CA April 22, 2014
Purdue University, West Lafayette, IN April 17, 2014
Swarthmore College, Swarthmore, PA March 28, 2014
University of Chicago, Chicago, IL March 14, 2014

A Fix for Dynamic Scope

OOPSLA PC Meeting, UCLA, Los Angeles, CA May 14, 2014
ML Workshop, Boston, MA September 22, 2013

Nested Refinement Types for JavaScript

Northeastern University, Boston, MA September 30, 2013

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|---|-------------------|
| University of California, San Diego, CA (Dissertation Defense) | September 3, 2013 |
| University of California, San Diego, CA (Thesis Proposal) | November 16, 2011 |
| Static Verification for Web Scripting Languages | |
| University of Washington, Seattle, WA | April 18, 2013 |
| Microsoft Research, Cambridge, UK | April 9, 2013 |
| Microsoft Research, Redmond, WA | April 3, 2013 |
| University of Texas, Austin, TX | March 19, 2013 |
| IBM Research, Yorktown Heights, NY | March 14, 2013 |
| University of Michigan, Ann Arbor, MI | February 28, 2013 |
| Georgetown University, Washington, DC | February 25, 2013 |
| Oregon State University, Corvallis, OR | February 13, 2013 |
| Refinement Types for JavaScript Security | |
| Brown University, Providence, RI | January 28, 2013 |
| Rutgers University, New Brunswick, NJ | January 23, 2013 |
| Dependent Types for JavaScript | |
| HCSS, Annapolis, MD | May 7, 2013 |
| SoCal, Riverside, CA | November 30, 2012 |
| OOPSLA, Tucson, AZ | October 24, 2012 |
| Dagstuhl, "Web Application Security," Wadern, Germany | October 2, 2012 |
| JSTools, Beijing, China | June 13, 2012 |
| STOP, Beijing, China | June 11, 2012 |
| Nested Refinements: A Logic for Duck Typing | |
| POPL, Philadelphia, PA | January 26, 2012 |
| Dagstuhl, "Foundations of Scripting Languages," Wadern, Germany | January 4, 2012 |
| SoCal, La Jolla, CA | December 3, 2011 |
| Type Inference with Run-time Logs | |
| STOP, Austin, TX | January 29, 2011 |
| Kyoto University, Kyoto, Japan | January 17, 2011 |
| SoCal, Los Angeles, CA | December 4, 2010 |
| Fine + DCIL: End-to-end Verification of Security Enforcement | |
| Microsoft Research, Redmond, WA | August 7, 2009 |
| Staged Information Flow for JavaScript | |
| PLDI, Dublin, Ireland | June 16, 2009 |

Teaching Experience

University of Chicago

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|---|-------------|
| Honors Introduction to Computer Science I (undergraduate) | Fall 2018 |
| Honors Introduction to Computer Science I (undergraduate) | Fall 2017 |
| Honors Introduction to Computer Science I (undergraduate) | Fall 2016 |
| Honors Introduction to Computer Science I (undergraduate) | Fall 2015 |
| Honors Introduction to Computer Science I (undergraduate) | Fall 2014 |
| Functional Programming (undergraduate) | Spring 2017 |
| Functional Programming (undergraduate) | Winter 2016 |
| Functional Programming (undergraduate) | Winter 2015 |
| Topics in Programming Languages: Direct Manipulation Programming (graduate) | Spring 2018 |
| Topics in Programming Languages: Program Synthesis (graduate) | Spring 2017 |
| Topics in Programming Languages: Program Synthesis (graduate) | Spring 2016 |
| Topics in Programming Languages: Types and Contracts (graduate) | Spring 2015 |

University of California, San Diego

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|---|-------------|
| Programming Languages: Principles and Paradigms (undergraduate) | Winter 2014 |
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University of Pennsylvania

Hardware and Software Algorithms (co-instructor, Summer Academy in Applied Science & Tech.)
C# Programming (unofficial instructor)

July 2007
Spring 2007

Students

Current Postdoctoral Advisees

Mikaël Mayer 2017 – present
Cyrus Omar 2017 – present

Current Ph.D. Advisees

Nick Collins 2018 – present
Brian Hempel 2015 – present

Current Undergraduate Advisees

Justin Lubin 2017 – present

Former Undergraduate Advisees

Jacob Albers 2015
Grace Lu Deuce: Direct Manipulation Source Program Editor (BS Thesis) 2017
Izaak Meckler Mote: Goal-Driven Development and Synthesis for Haskell (BS Thesis) 2015
Eri Rogers 2017
Amy Sitwala 2016
Mitchell Spradlin 2015
Bowen Wang Predicting Haskell Type Signatures from Names (BS/MS Thesis) 2015 – 2018
Chris Winkler 2018
John Zhao 2016

Professional Service

Organizing Committees

Systems, Programming, Languages and Applications: Software for Humanity (Local Chair) SPLASH 2020
Programming Language Design and Implementation (Artifact Evaluation Co-chair) PLDI 2019
Live Programming Workshop (Co-organizer) LIVE 2018
International Conference on Functional Programming (Student Research Competition Chair) ICFP 2018
Programming Language Design and Implementation (Artifact Evaluation Co-chair) PLDI 2018
Midwest PL Summit (Co-organizer) MWPLS 2016

Program Committees

Workshop on Bidirectional Transformations Bx 2019
Art, Science, and Engineering of Programming <Programming> 2019
Workshop on Evaluation and Usability of Programming Languages and Tools PLATEAU 2018
Programming Experience Workshop (PX) PX/18
Live Programming Workshop LIVE 2017
Programming Language Design and Implementation PLDI 2017
Trends in Functional Programming TFP 2016
European Conference on Object-Oriented Programming ECOOP 2016
Script to Program Evolution Workshop STOP 2015
Principles of Programming Languages POPL 2015
Object-Oriented Programming Languages, Systems, and Applications OOPSLA 2014
Foundations of Object-Oriented Languages FOOL 2013

External Review Committees

Programming Language Design and Implementation PLDI 2016
Object-Oriented Programming Languages, Systems, and Applications OOPSLA 2015
Programming Language Design and Implementation PLDI 2014

Student Research Competition Committees

Principles of Programming Languages POPL 2016

Programming Language Design and Implementation PLDI 2015

Artifact Evaluation Committees

Programming Language Design and Implementation PLDI 2014

External Reviews

User Interface Software and Technology UIST 2018
Principles of Programming Languages POPL 2014, 2016
Object-Oriented Programming Languages, Systems, and Applications OOPSLA 2011
European Symposium on Programming ESOP 2011
Compiler Construction CC 2009

Journal Article Reviews

New Generation Computing 2015
Transactions on Programming Languages and Systems TOPLAS 2013, 2014

Grant Proposal Panels and Reviews

National Science Foundation 2015, 2017, 2018

Board Memberships

Elm Software Foundation 2017 – present

Talk Selection Committees

Elm Conference elm-conf 2018

University Service

Doctoral Thesis Committees

Mikaël Mayer (EPFL) Advisor: Viktor Kunčák 2017
Tanakorn Leesatapornwongsa Advisor: Haryadi Gunawi 2017
Lamont Samuels Advisor: John Reppy 2016

Masters Thesis Committees

Brian Hempel 2018
Bowen Wang 2018
Junwen Yang Advisor: Shan Lu 2018
Guangpu Li Advisor: Shan Lu 2017
Joe Wingerter Advisor: John Reppy 2017
Kavon Farvardin Advisor: John Reppy 2017
Austin Byers Advisor: Ari Feldman 2016
Tanakorn Leesatapornwongsa Advisor: Haryadi Gunawi 2014

University Award Committees

Liew Family College Research Fellows 2017